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Age and Size Composition of the Menhaden Catch Along the Atlantic Coast of the United States, 1962

With a Brief Review of the Commercial Fishery

by William R. Nicholson and Joseph R. Higham, Jr.

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ABSTRACT

The 1962 purse seine catch of Atlantic menhaden, Brevoortia tyrannus, was 600,000 tons in the summer fishery and 29,000 tons in the North Carolina fall fishery. The mean catch per purse seine set, based on an estimated number of 26,176 sets, was 24 tons. The 1958 year class (age 4) dominated the fishery in the Middle and North Atlantic Areas for the fourth consecutive year and provided 5 percent of the catch in the Chesapeake Bay Area and 36 percent of the catch in the North Carolina fall fishery. On the basis of its contribution to the fishery in the Chesapeake Bay and Middle Atlantic Areas, the incoming year class (1961) appeared to be less than average in abundance. Except for age-0 fish, the mean lengths and weights in the South Atlantic Area in 1962 were less than the means for the previous 7-year period. The means for age-4 fish were less than the 7-year means in the Middle and North Atlantic Areas, but slightly greater in the Chesapeake Bay Area. With few exceptions, the mean lengths and weights of other age groups in the Chesapeake Bay, Middle Atlantic, and North Atlantic Areas were greater than the 7-year means.

INTRODUCTION

This is the eighth in a series of annual reports that review the purse seine fishing season for the Atlantic menhaden, Brevoortia tyrannus. Summarized and discussed briefly are data for 1962 on the age, size, and sex composition of the catches, the number of vessels in the fishery, and the distribution of fishing activity. Comparable information for 1955-61 also is included. Four geographical areas (fig. 1) and the North Carolina fall fishery, a specialized fishery within the South Atlantic Area, are subdivisions of the fishery used in the summary and review of the data.

THE 1962 PURSE SEINE FISHERY

The purse seine catch of Atlantic menhaden in 1962 was 629,000 tons--slightly better than in 1961. This total catch included 600,000 tons caught in the summer fishery and 29,000 tons caught in the North Carolina fall fishery (table 1). Catches in 1962 were smaller than in 1961 in the South and Middle Atlantic Areas and in the North Carolina fall fishery, but larger in the Chesapeake Bay and North Atlantic Areas. As in previous years, the Middle Atlantic Area provided the largest part of the catch, but the North Carolina fall fishery,

Table 1.--Mean annual catch, mean number of purse seine sets, and mean catch per set, 1955-61; and the catch, number of sets, and catch per set, 1962, Atlantic menhaden purse seine fishery

Season and area	Catch		Purse seine sets		Mean catch per purse seine set	
	Mean 1955-61	1962[1]	Mean 1955-61	1962	Mean 1955-61	1962
SUMMER FISHERY	Thousand tons	Thousand tons	Number	Number	Tons	Tons
South Atlantic....	53	[2] 48	3,078	3,000	17	16
Chesapeake Bay....	135	[2] 166	7,809	7,084	17	23
Middle Atlantic...	311	307	13,089	12,472	24	25
North Atlantic....	67	79	2,547	3,239	26	25
Total.....	566	600	26,523	25,795	21	23
FALL FISHERY						
North Carolina....	75	[3] 29	1,845	513	41	57
Grand total.....	641	629	28,368	26,308	23	24

[1] Source: Fishery statistics of the United States, 1962, by Edward A. Power, U. S. Fish and Wildlife Service, Statistical Digest No. 56.

[2] Fish caught in the Chesapeake Bay area and landed at Wildwood are included in the catch for the Chesapeake Bay area.

[3] The North Carolina fall fishery normally extends into January; therefore, catch total includes January 1963, but not January 1962. Seasonal breakdown of the catch was obtained from U. S. Fish and Wildlife Service, C.F.S. Nos. 2835 and 3132.

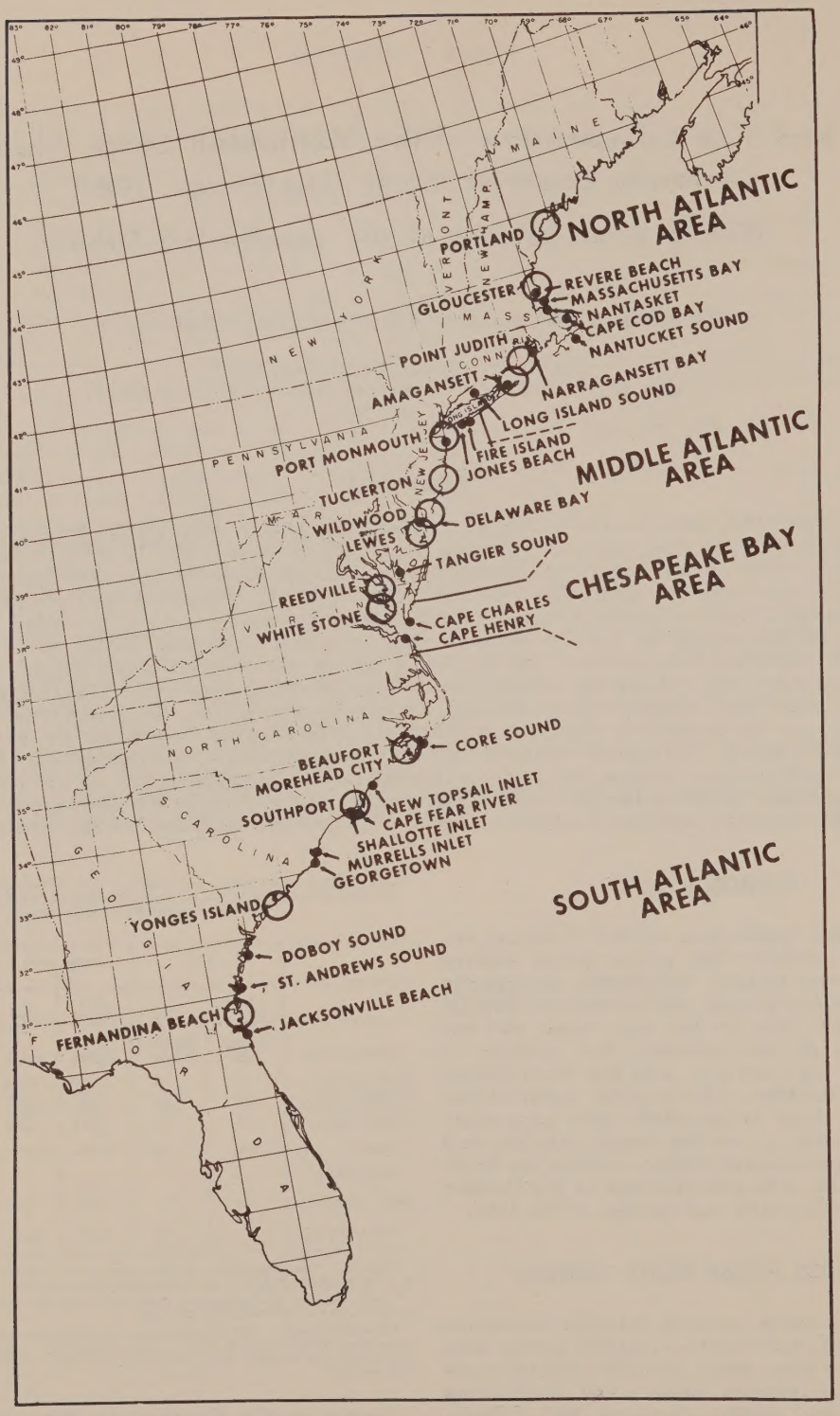

Figure 1.--Map showing locations mentioned in the text, menhaden reduction plants (encircled), and geographic areas used in summarizing catch data on the Atlantic menhaden.

rather than the summer fishery in the South Atlantic Area, provided the smallest part of the catch.

The number of purse seine sets in 1962 was 10 percent less in the summer fishery than in 1961, and 59 percent less in the fall fishery; the total number of sets was less than in any previous year for which we have records (table 1). The large decrease in the fall fishery was due principally to unfavorable weather.

The mean catch per set was 23 tons in the summer fishery and 24 tons in the total fishery, both slightly more than the 1955-61 mean, and 57 tons in the North Carolina fall fishery, considerably more than the 1955-61 mean (table 1).

South Atlantic Area

Three vessels fished out of Fernandina Beach, Fla., five out of Southport, N.C., and eight out of Beaufort, N.C.

Vessels from Fernandina Beach made the first landings of the season on April 9 off Jacksonville Beach, Fla. Fishing through June was confined to waters between Jacksonville Beach and St. Andrews Sound, Ga. From July 2 to about July 18, scattered landings also were made as far north as Doboy Sound, Ga. From the middle of July until the season ended on November 12, nearly all catches were made between St. Andrews Sound and Jacksonville Beach.

Southport vessels began fishing on May 10, and landings were good throughout May and June. Although most fishing in May was done between Shallotte Inlet and the mouth of the Cape Fear River, N.C., some purse seining sets were used as far north as New Topsail Inlet. In June and early July, concentrations of fish were found as far south as Georgetown, S.C., but from July 7 to August 2, fish were so scarce that the vessels remained in port most of the time (catches were landed only on July 17, 20, and 23). Fish became more abundant from August 2 to September 4, but still were relatively scarce. Although schools of fish were found for a few days off Georgetown, most schools were located between Shallotte Inlet and the Cape Fear River. Fishing improved during September and October, with fair catches being made from the Cape Fear River area to Murrells Inlet, S.C. The season ended on October 25.

Fishing began at Beaufort, N.C., on May 4. Three large vessels made frequent catches in outside waters until June 7, but made only 12 landings during the remainder of the season. Five small vessels fished in Core Sound from May 7 to October 12. Fishing was good through May and June but poor in July. It improved in early August, remained fair through mid-September, and became poor again the rest of the season, which ended October 12.

The catch in the South Atlantic Area summer fishery was 48,000 tons, 1,000 tons less than in 1961. The largest percentage of the season's catch was taken in August (22 percent), followed by June (19 percent), May (18 percent), July (16 percent), September (16 percent), October (8 percent), and April (1 percent).

Chesapeake Bay Area

The fleet comprised 24 vessels from Chesapeake Bay plants and, from about June 2 to September 14, 5 vessels from Wildwood, N.J. Since Virginia's regulations prohibit purse seining in Chesapeake Bay before the last Monday in May, no catches from the Bay were landed until May 28. Prior to that date, eight landings were made outside the mouth of Chesapeake Bay. Through the middle of June, fishing was concentrated at the mouth of the Bay, but as fish disappeared, the fleet shifted to the vicinity of Tangier Island. Although fishing during the rest of the season occurred over most of the Bay, it was concentrated along the Maryland-Virginia boundary. The season ended November 2.

The purse seine catch of the Chesapeake Bay Area was 166,000 tons, 36,000 tons more than in 1961. July ranked first in percentage of catch (32 percent), followed by June (25 percent), October (19 percent), August (15 percent), and September (9 percent).

Middle Atlantic Area

Forty-seven vessels fished from ports in the Middle Atlantic Area--21 from Lewes, Del., 10 from Wildwood, N.J., 6 from Tuckerton, N.J., and 10 from Port Monmouth, N.J.

The first catches were landed by Wildwood, Lewes, and Tuckerton vessels on May 16, the earliest date fish were landed since 1949. Port Monmouth boats landed fish on May 19. Initially, fish were plentiful, and all boats made good catches of large fish that were mainly from the 1958 year class. These fish remained off the northern New Jersey coast and the southern shore of western Long Island most of June. In early July these large fish disappeared, and schools became scarce until October. Landings during July, August, and September were less than in any year since the investigation started in 1955. Five vessels from Wildwood moved to Chesapeake Bay during the first week of August and did not return until the middle of September. At Port Monmouth no boats fished from August 11 to 20, and at Lewes three vessels quit fishing during the second week in August, one during the third week, and one during the fourth week. In October, large schools composed primarily of age-4 fish (1958 year class) appeared off the

southern shore of eastern Long Island. Excellent catches were made throughout the month as these fish moved westward off the Long Island coast. The last landing, made on October 31, ended the longest season for which we have records.

The total purse seine catch was 307,000 tons, the same as in 1961. If unusually large catches had not been made in late May, June, and again in October, the season would have been the poorest in several decades. June ranked first in percentage of the season's catch (28 percent), followed by October (21 percent), May (19 percent), July (14 percent), September (9 percent), and August (9 percent).

North Atlantic Area

The purse seine fleet consisted of 20 vessels--10 from Amagansett, N.Y., 6 from Point Judith, R.I., and 4 from Gloucester, Mass.

One vessel from Amagansett landed fish on May 26, but the entire fleet did not begin fishing until May 28. Although some landings were made in Nantucket and Long Island Sounds, until the middle of July most of the catches were made off the southern shore of western Long Island from Jones Beach to Fire Island. Throughout this period catches were large. From the middle of July until early October, fish were scarce in all localities, and the vessels ranged from western Long Island Sound and the southern shore of western Long Island to Nantucket Sound and Cape Cod Bay. Large schools of migrating fish appeared off the southern shore of Long Island during the second week of October and remained most of the month. Aided by favorable weather, the Amagansett fleet made the largest October catch on record. Fishing ended October 26.

The first catches by Point Judith vessels were made May 27 in Narragansett Bay, and the last catches September 17. Fish disappeared from that locality in mid-June, and the boats moved to Nantucket Sound, where they remained until fish disappeared at the end of the month. The vessels returned to Narragansett Bay in July and, except for scattered catches in Nantucket and Long Island Sounds, remained there until fishing ended. After the middle of July, however, only three vessels continued fishing, and catches were small. The Point Judith plant was closed by civil ordinance on July 12 because of air pollution. It reopened July 30, but processed liquid fish only for the remainder of the season. After July 12, catches not landed at Point Judith were unloaded either at Amagansett or into a special carrier vessel in Narragansett Bay and transported to the Amagansett plant.

Fishing by Gloucester vessels began June 8 and ended August 25. Until the second week in July all fishing was done in Massachusetts Bay between Revere Beach and Nantasket. The boats fished in lower Cape Cod Bay for about 1 week in mid-July and then returned to Massachusetts Bay, where they continued fishing until the end of the season.

The catch in the North Atlantic Area was 79,000 tons, 24,000 tons more than in 1961. June ranked first in percentage of catch (26 percent), followed by October (24 percent), July (20 percent), August (14 percent), September (13 percent), and May (3 percent).

North Carolina Fall Fishery

The season was marked by the late arrival of fish and unusually bad weather. Only a few scattered landings were made before November 15. During the following week, weather was fair and catches were good. Bad weather began again on November 25, however, and continued to the end of the season. In the few brief days between periods of high winds or unseasonable cold, few fish were located, and only 15 small landings were made.

Most of the 45 boats in the fishery did not fish after November 24. The season's catch was 29,000 tons, the smallest since 1952. November ranked first in percentage of catch (98 percent), followed by December (2 percent).

Distribution of Purse Seine Sets

The estimated numbers of purse seine sets within 10-minute unit areas are shown in figure 2. Nearly all sets were made within the 20-fathom contour between lat. 29°40' N. and 42°50' N. Most of the sets were in Chesapeake and Delaware Bays and in coastal waters from Cape Henry, Va., to Long Island, N.Y.

For the third consecutive year no fishing was done north of Massachusetts Bay, but in contrast to 1961, fishing within the Bay was good and about 640 sets were made.

Fishing in the Chesapeake Bay Area in 1962 was distributed uniformly throughout the area, although a somewhat greater number of sets was made in the upper part of the Bay along the Maryland - Virginia border. This distribution is in contrast to 1961, when over 85 percent of the sets were around the mouth of the Bay.

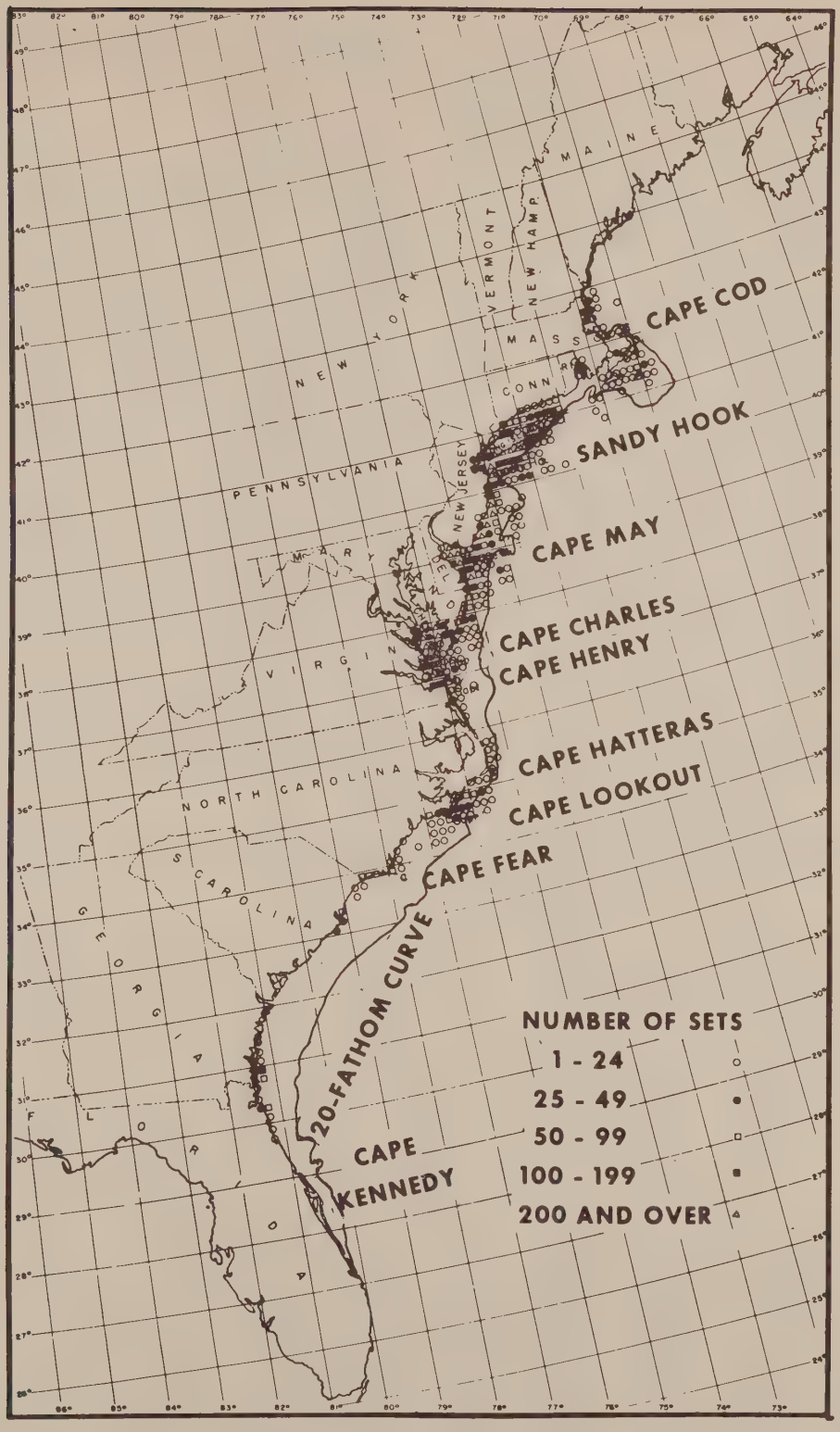

Figure 2.--Distribution of purse seine sets for Atlantic menhaden, 1962.

SAMPLING OF THE CATCH

Sampling procedures followed those described by June and Reintjes (1959). The number of samples taken at each port ranged from 12 to 193 (table 2). The number of tons of fish landed per sample was 784 for the summer fishery and 1,160 for the North Carolina fall fishery.

Table 2.--Number of samples of Atlantic menhaden taken from purse seine catches, by season and locality, 1962

Season and locality	Samples
SUMMER FISHERY	Number
Fernandina Beach, Fla.	36
Southport, N.C.	19
Beaufort, N.C.	39
Reedville, Va.	193
Lewes, Del.	169
Port Monmouth, N.J.	158
Amagansett, N.Y.	127
Point Judith, R.I.	12
Gloucester, Mass.	13
Subtotal	769
FALL FISHERY	
Beaufort-Morehead City, N.C.	25
Total	794

Age Composition

The percentage age composition and the calculated number of fish at each age in the purse seine catches from 1955 to 1962 are listed in table 3. The total number of fish caught in 1962 was the smallest on record.

Age-1 to -4 fish constituted nearly 95 percent of the catch in 1962. Age-2 fish (1960 year class) contributed 39 percent (850.0 million fish), age-1 fish (1961 year class) 24 percent (522.4 million), age-4 (1958 year class) 21 percent (460.3 million), and age-3 (1959 year class) 11 percent (235.7 million).

As in most previous years, fish of age 5 and over constituted only a small percentage of the fish landed. The 1958 year class, although not providing the greatest percentage of the catch as in the previous 3 years, was still abundant and contributed over half the total weight of fish landed. Furthermore, this abundant year class contributed more 4-year-old fish to the catch than any year class in 1955-62.

The percentage age composition of the catches, by area, for 1962 is shown in figure 3, and listed in table 4. The calculated number of fish in the different age groups is listed in table 5.

Table 3.--Age composition (in percent) and calculated number of Atlantic menhaden (in millions) at each age in purse seine catches, 1955-62

[Most numerous age group underscored]

Year	Age									
	0	1	2	3	4	5	6	7	8-10	Total
Age composition:										
1955	24.71	20.68	34.21	8.73	10.01	1.23	0.35	0.06	0.02	100.00
1956	1.00	57.16	25.97	9.61	1.26	4.18	0.67	0.12	0.02	99.99
1957	8.46	41.97	41.00	3.26	2.52	1.40	1.22	0.12	0.04	99.99
1958	3.81	30.85	60.93	2.72	0.62	0.56	0.32	0.17	+[1]	99.98
1959	0.21	74.69	16.27	7.58	0.67	0.22	0.24	0.08	0.03	99.99
1960	2.47	16.98	72.78	2.77	3.72	0.86	0.31	0.08	0.03	100.00
1961	0.01	30.60	19.28	48.06	0.76	1.15	0.11	0.02	0.01	100.00
1962	2.36	23.90	38.90	10.79	21.06	1.56	1.24	0.15	0.04	100.00
Number of fish:										
1955	761.01	636.86	1,053.47	268.87	308.21	37.95	10.75	1.88	0.59	3,079.59
1956	36.37	2,072.95	941.71	348.42	45.60	151.49	24.38	4.47	0.88	3,626.27
1957	300.77	1,491.13	1,456.63	115.96	89.72	49.66	43.43	4.34	1.27	3,552.91
1958	106.06	858.29	1,694.99	75.75	17.31	15.61	9.01	4.69	0.10	2,781.81
1959	11.40	4,120.10	897.34	418.42	37.15	12.35	13.06	4.71	1.82	5,516.35
1960	72.17	495.82	2,125.45	80.85	108.63	25.26	9.07	2.48	0.68	2,920.41
1961	0.25	832.25	524.30	1,307.34	20.73	31.42	2.95	0.51	0.26	2,720.01
1962	51.58	522.42	850.02	235.73	460.34	34.08	27.20	3.26	0.79	2,185.42

[1] + = <0.01 percent.

Table 4.--Age composition (in percent) of Atlantic menhaden purse seine catches, by age, season, area, and year, 1955-62

[Most numerous age group underscored]

Season, area, and year	Age								
	0	1	2	3	4	5	6	7	8-10
SUMMER FISHERY									
South Atlantic:									
1955	1.66	65.22	27.02	3.32	2.77	--	--	--	--
1956	--	98.98	0.94	0.05	0.02	--	--	--	--
1957	3.65	32.47	63.76	0.12	--	--	--	--	--
1958	0.32	68.44	29.40	1.79	0.06	--	--	--	--
1959	--	90.90	8.95	0.15	--	--	--	--	--
1960	3.47	28.00	68.53	--	--	--	--	--	--
1961	--	78.52	12.49	8.94	0.05	--	--	--	--
1962	0.40	53.92	45.36	0.33	--	--	--	--	--
Chesapeake Bay:									
1955	1.63	44.77	51.30	1.54	0.69	0.06	--	--	--
1956	--	90.91	9.02	0.07	--	--	--	--	--
1957	0.25	85.22	14.25	0.26	0.02	0.01	--	--	--
1958	0.04	46.32	53.01	0.50	0.08	0.04	--	--	--
1959	0.47	90.12	8.76	0.65	--	--	--	--	--
1960	--	17.55	82.12	0.33	--	--	--	--	--
1961	--	43.50	28.80	27.63	0.04	0.02	--	--	--
1962	6.24	30.12	53.73	4.77	5.11	0.04	--	--	--
Middle Atlantic:									
1955	--	1.81	55.79	23.18	17.43	1.40	0.26	0.10	0.01
1956	--	14.78	63.96	18.08	1.44	1.41	0.26	0.06	0.01
1957	--	22.24	68.51	4.26	2.62	1.26	1.02	0.03	0.05
1958	--	2.54	95.08	2.21	0.12	0.03	0.02	--	--
1959	--	57.94	30.27	11.31	0.30	0.06	0.07	0.04	--
1960	--	1.01	95.29	1.24	1.82	0.41	0.17	0.04	0.02
1961	--	0.35	18.11	80.29	0.59	0.55	0.08	0.02	0.01
1962	--	2.22	28.40	22.54	42.14	2.45	2.00	0.21	0.04
North Atlantic:									
1955	--	--	0.25	13.94	67.55	12.84	4.65	0.54	0.22
1956	--	--	6.41	36.35	8.22	40.96	6.42	1.29	0.36
1957	--	0.91	45.00	18.79	16.06	8.59	8.95	1.46	0.24
1958	--	0.16	52.58	24.47	8.43	6.75	5.13	2.36	0.11
1959	--	4.62	21.13	57.90	7.56	3.11	3.20	1.77	0.71
1960	--	--	44.92	21.39	26.93	4.90	1.48	0.36	0.01
1961	--	--	3.10	79.55	5.53	10.49	1.01	0.22	0.10
1962	--	--	1.53	17.72	63.53	8.28	7.67	0.86	0.41
FALL FISHERY									
North Carolina:									
1955	87.19	3.61	6.00	0.86	1.96	0.32	0.04	--	0.01
1956	16.12	26.78	11.95	16.61	4.15	20.61	3.31	0.46	--
1957	74.20	3.24	6.08	4.07	5.40	3.84	2.89	0.25	0.02
1958	38.07	10.73	35.86	7.18	2.63	3.14	1.48	0.91	--
1959	0.39	3.84	20.11	58.00	10.30	3.21	3.40	0.44	0.30
1960	31.37	7.70	20.86	12.18	18.92	5.87	2.17	0.71	0.22
1961	0.14	6.14	25.90	58.43	3.30	5.73	0.35	--	--
1962	11.42	1.16	28.15	12.47	36.22	6.79	2.98	0.81	--

Table 5.--Calculated number of Atlantic menhaden (in millions) in purse seine catches, by age, season, area, and year, 1955-62

[Most numerous age group underscored]

Season, area, and year	Age									Total
	0	1	2	3	4	5	6	7	8-10	
SUMMER FISHERY										
South Atlantic:										
1955	6.51	255.20	105.74	13.01	10.83	--	--	--	--	391.29
1956	--	1,147.88	10.91	0.63	0.23	0.02	--	--	--	1,159.67
1957	13.27	117.91	231.56	0.42	--	--	--	--	--	363.16
1958	1.47	315.20	135.39	8.25	0.26	--	--	--	--	460.57
1959	--	1,051.86	103.53	1.72	--	--	--	--	--	1,157.11
1960	13.86	111.84	273.73	--	--	--	--	--	--	399.43
1961	--	506.20	80.51	57.65	0.30	--	--	--	--	644.65
1962	2.21	297.55	250.30	1.81	--	--	--	--	--	551.87
Chesapeake Bay:										
1955	12.18	334.24	382.92	11.52	5.17	0.43	--	--	--	746.46
1956	--	674.37	66.90	0.49	--	--	--	--	--	741.76
1957	3.12	1,056.16	176.58	3.22	0.22	0.08	--	--	--	1,239.38
1958	0.48	490.88	561.76	5.25	0.90	0.39	--	--	--	1,059.66
1959	10.71	2,058.36	200.20	14.78	--	--	--	--	--	2,284.05
1960	--	142.58	666.94	2.64	--	--	--	--	--	812.16
1961	--	311.76	206.42	197.99	0.32	0.16	--	--	--	716.65
1962	42.40	207.34	366.13	32.28	34.69	0.27	--	--	--	683.11
Middle Atlantic:										
1955	--	16.66	513.31	312.26	160.40	12.90	2.34	0.96	0.12	1,018.95
1956	--	190.28	823.35	232.82	18.60	18.19	3.31	0.71	0.13	1,287.39
1957	--	302.78	932.53	58.05	35.72	17.15	13.92	0.40	0.69	1,361.24
1958	--	22.73	850.63	19.75	1.07	0.31	0.17	--	--	894.66
1959	--	994.72	519.71	194.19	5.13	1.02	1.22	0.75	--	1,716.74
1960	--	13.57	1,277.75	16.64	24.42	5.45	2.33	0.51	0.23	1,340.90
1961	--	3.58	187.61	831.67	6.15	5.68	0.83	0.18	0.11	1,035.81
1962	--	16.82	214.36	170.24	318.28	18.54	15.08	1.61	0.24	755.17
North Atlantic:										
1955	--	--	0.42	23.76	115.10	21.88	7.93	0.92	0.37	170.38
1956	--	--	13.58	77.00	17.41	86.78	13.59	2.73	0.75	211.84
1957	--	1.87	92.66	38.68	33.07	17.69	18.44	2.99	0.50	205.90
1958	--	0.14	49.13	22.87	7.88	6.31	4.80	2.21	0.10	93.44
1959	--	8.28	37.92	103.91	13.58	5.59	5.75	3.18	1.28	179.48
1960	--	--	81.78	38.93	49.04	8.91	2.70	0.65	0.03	182.04
1961	--	--	4.60	118.14	8.21	15.58	1.50	0.33	0.15	148.51
1962	--	--	2.05	23.79	85.28	11.12	10.29	1.15	0.55	134.23
FALL FISHERY										
North Carolina:										
1955	742.32	30.76	51.08	7.32	16.71	2.74	0.39	--	0.10	851.42
1956	36.37	60.42	26.97	37.48	9.36	46.50	7.48	1.03	--	225.61
1957	284.39	12.41	23.30	15.60	20.72	14.74	11.07	0.95	0.08	383.26
1958	106.06	29.34	98.08	19.63	7.20	8.60	4.04	2.48	--	273.48
1959	0.69	6.87	35.99	103.81	18.44	5.75	6.09	0.78	0.54	178.96
1960	58.31	14.32	38.76	22.63	35.17	10.90	4.03	1.32	0.42	185.86
1961	0.25	10.71	45.17	101.90	5.76	10.00	0.62	--	--	174.41
1962	6.97	0.71	17.17	7.61	22.10	4.15	1.82	0.50	--	61.03

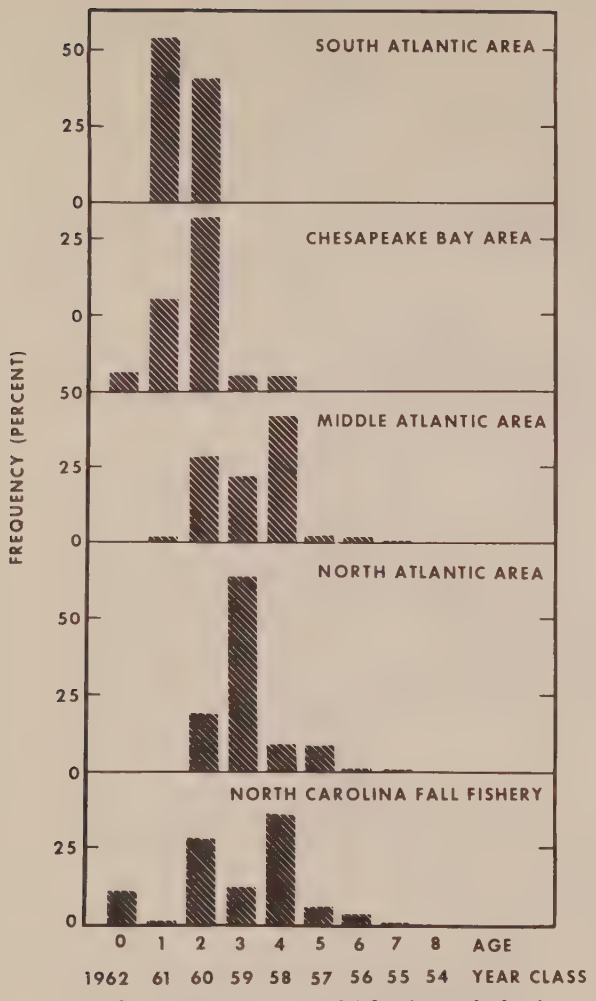

Figure 3.--Age composition of Atlantic menhaden in samples from purse seine catches, 1962.

In the South Atlantic Area, age-1 and -2 fish again furnished the largest number of fish (547.9 million) and the largest percentage (99) of the catch. As in most of the previous years on record, age 1 were the most abundant age group in the catch, but the percentage (54) was smaller than usual.

In the Chesapeake Bay Area, the catch contained fish of ages 0 to 5. Age-4 fish (1958 year class) contributed 34.7 million fish, or over 5 percent of the catch, the first year on record that this age group contributed more than a fraction of 1 percent in this area. Age 3 contributed 32.3 million fish, or nearly 5 percent of the catch, also a large contribution for this age group. Age 1 furnished only 207.3 million fish (30.1 percent), the smallest number of fish and the smallest percentage of the catch for this age group in any year on record, except 1960. Age-0 fish furnished 42.4 million fish (6.2 percent), nearly 30 million more than in the previous record year, 1955. The total number of fish (683 million) declined for the third consecutive year and was the smallest in the 8-year period.

Although fish of ages 1 to 9 contributed to the catch in the Middle Atlantic Area, age 4 furnished the greatest number of fish (318.3 million) and the largest percentage of the catch (42.1). This was the largest share of the catch contributed by this age group from 1955-62. By contrast, age 2 provided the smallest number of fish (214.4 million) and the smallest percentage of the catch (28.4) for any year on record except 1961. Fish older than age 4 were relatively unimportant, contributing only 35.5 million fish, or 4.7 percent of the catch. The total number of fish caught (755 million) declined for the third consecutive year and was less than in any year from 1955-62.

The catch in the North Atlantic Area, comprising fish of ages 2 to 8, also was dominated by age-4 fish, which furnished the largest number of fish (85.3 million) and the largest percentage of the catch (64) since 1955. Fish older than age 4 numbered 23.1 million (17.2 percent of the catch), slightly more than in recent years. Age-3 and age-2 fish, however, contributed the smallest number of fish (25.8 million) and the smallest percentage of the catch (19.3) since 1955. The total catch numbered 134 million, the smallest in any year on record except 1958.

Fish of ages 0 to 7 were found in the catch from the North Carolina fall fishery; age 4 furnished 22.1 million fish, or 36 percent, the largest percentage of the catch by this age group in 8 years. The number of fish of all ages, however, was only 61 million, or 65 percent, less than the smallest number landed during 1956-62.

Length Composition

The length-frequency distributions (percentages) of fish in samples from purse seine catches are shown by age and area in figure 4 (see also appendix tables 1-5). The composite frequency curves and the numbers represent all of the individuals in the samples. The frequency curves for the different age groups are based on only the 20 fish of each sample which were aged.

The lengths of fish caught in the South Atlantic Area ranged from 97 to 247 mm., and the frequency distribution was unimodal and symmetrical.

Because of unusually large numbers of older fish in the catches, lengths in the Chesapeake Bay Area ranged from 117 to 312 mm., somewhat greater than in previous years, and the frequency curve was relatively flat; three poorly defined peaks at 142, 202, and 257 mm. represented ages 0, 1, and 2, respectively.

Although more age groups than usual were present in catches from the Middle Atlantic

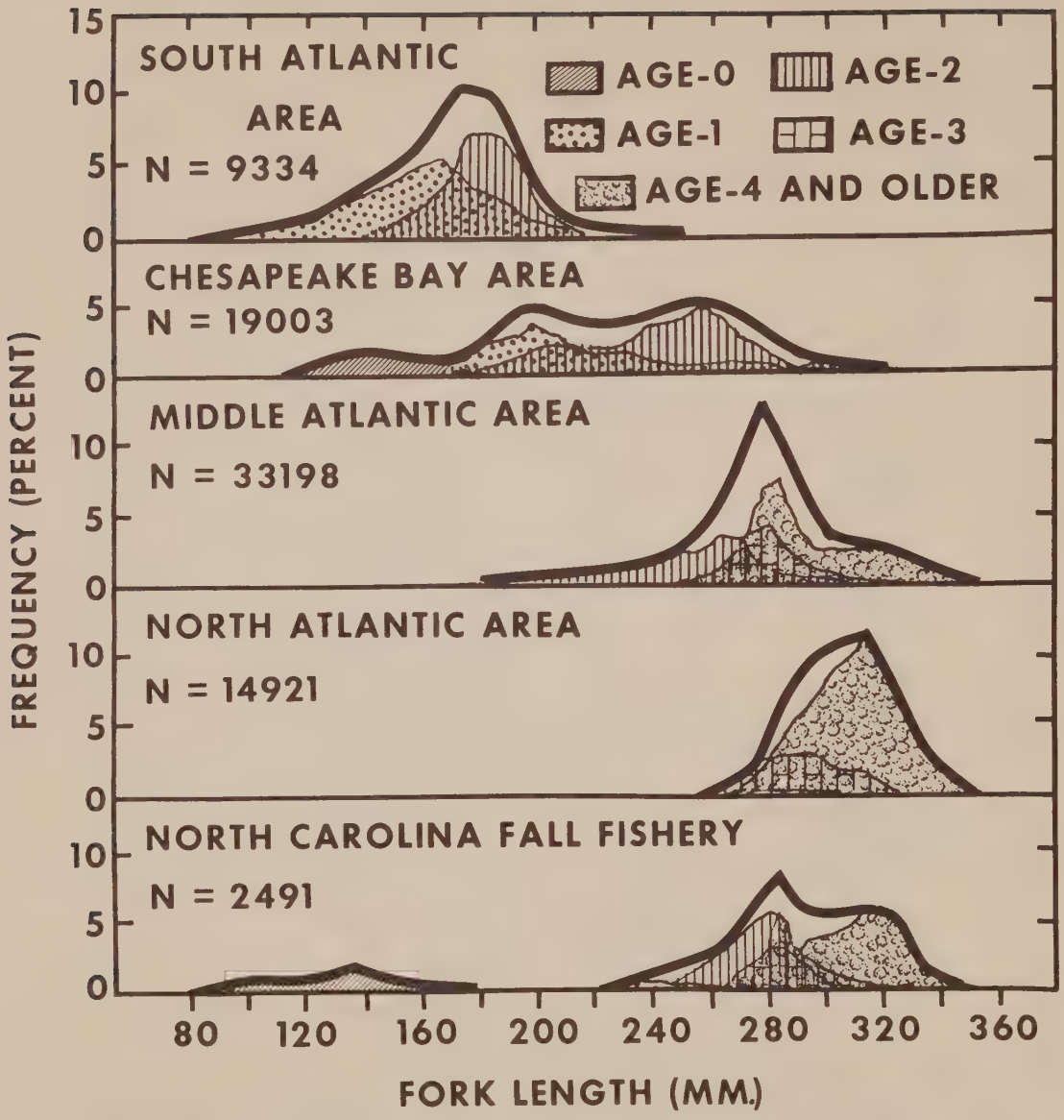

Figure 4.--Length composition of Atlantic menhaden in samples from purse seine catches, 1962.

Area, the composite frequency distribution curve was relatively symmetrical and unimodal. Lenghts ranged from 172 to 357 mm. with a mode at 277 mm.

The composite frequency curve of fish caught in the North Atlantic Area was symmetrical and unimodal; lengths ranged from 252 to 342 mm. Although age-4 fish dominated the catch, they generally were smaller than the age-4 fish in previous years. Fish younger than age 4 were less plentiful than in any previous year, but generally were larger.

The composite frequency curve of fish caught in the North Carolina fall fishery ranged from 102 to 347 mm.; age-0 and age-1 fish accounted for the portion between 102 and 167 mm., and age-1 to age-7 fish accounted for the portion between 227 and 347 mm.

As in previous years, females generally were larger than males. The greater differences occurred among the older, larger fish (fig. 5).

Sex ratios were nearly equal (table 6), with about the same variation as in past years.

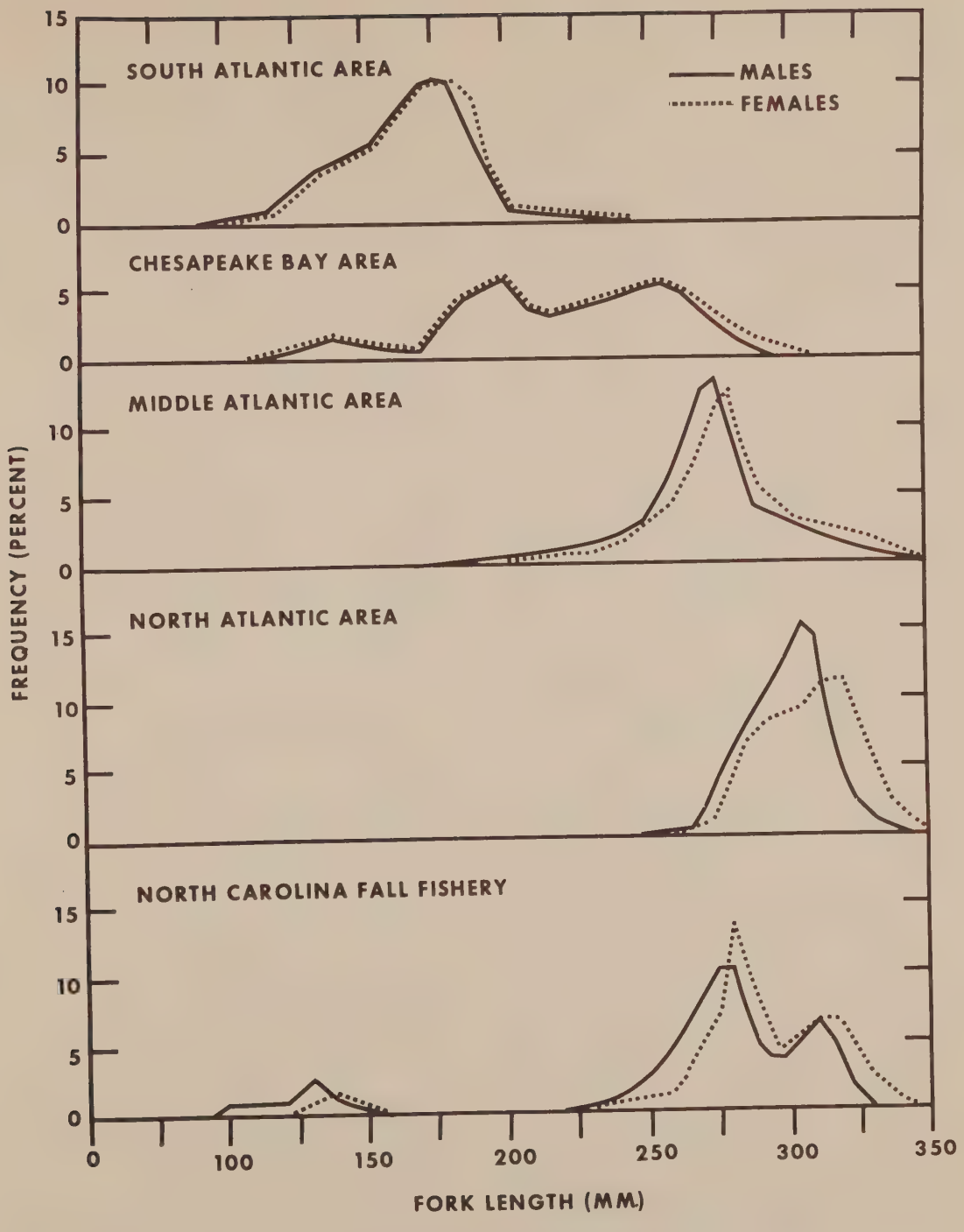

Figure 5.--Length frequencies of male and female Atlantic menhaden in samples from purse seine catches, 1962.

Table 6.--Sex ratio of Atlantic menhaden in purse seine catches, by season and area, 1962

Season and area	Males	Females	Females to males
SUMMER FISHERY	Number	Number	Ratio
South Atlantic.....	843	879	0.96
Chesapeake Bay.....	1,884	1,813	1.04
Middle Atlantic....	3,145	3,289	0.96
North Atlantic.....	1,321	1,516	0.87
FALL FISHERY			
North Carolina.....	224	264	0.85

Weight Composition

The weight-frequency distributions (in percentage) of fish in purse seine catch samples, by area, are shown in figure 6 (see also appendix tables 6-10). Weights of fish ranged widely in all areas except the South Atlantic Area, where two age groups constituted over 99 percent of the catch.

Mean Lenghts and Weights

The mean lengths and mean weights of fish for the 7-year period, 1955-61, and for 1962 are summarized in tables 7 and 8; the mean lengths and weights of each age group in the 1962 catches are given, by sex, in appendix tables 11-15.

Except for the South Atlantic Area, the mean lengths and mean weights of the combined age groups in 1962 were greater than those

Table 7.--Mean fork length (mm.) of Atlantic menhaden in purse seine catches, 1962, and mean of the mean lengths, 1955-61, by age, season, area, and year

Season, area, and year	Age											Mean
	0	1	2	3	4	5	6	7	8	9	10	
SUMMER FISHERY												
South Atlantic:												
1955-61.....	127	163	193	211	217	234	--	--	--	--	--	171
1962.....	152	158	181	203	--	--	--	--	--	--	--	169
Chesapeake Bay:												
1955-61.....	146	186	220	244	278	264	--	--	--	--	--	197
1962.....	144	205	239	270	280	287	--	--	--	--	--	224
Middle Atlantic:												
1955-61.....	--	213	243	271	301	310	321	325	326	327	--	246
1962.....	--	204	253	278	288	318	327	338	333	345	--	280
North Atlantic:												
1955-61.....	--	217	267	287	306	317	325	330	337	339	344	290
1962.....	--	--	282	294	304	318	324	331	339	--	--	305
FALL FISHERY												
North Carolina:												
1955-61.....	132	189	268	292	310	319	325	328	340	337	--	259
1962.....	129	208	273	288	299	313	322	339	--	--	--	277

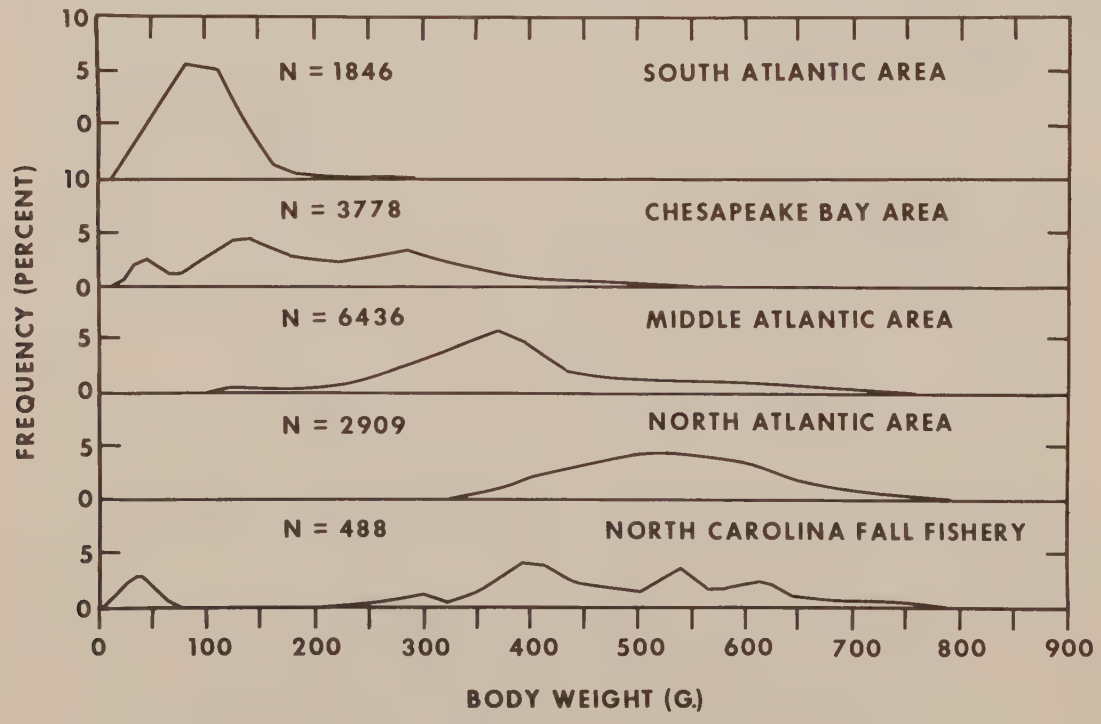

Figure 6.--Weight composition of Atlantic menhaden in samples from purse seine catches, 1962.

Table 8.--Mean weight (g.) of Atlantic menhaden in purse seine catches, 1962, and mean of the mean weights, 1955-61, by age, season, area, and year

Season, area, and year	Age											Mean
	0	1	2	3	4	5	6	7	8	9	10	
SUMMER FISHERY												
South Atlantic:												
1955-61	34	75	124	165	219	224	--	--	--	--	--	90
1962	65	73	109	164	--	--	--	--	--	--	--	90
Chesapeake Bay:												
1955-61	51	114	179	243	350	336	--	--	--	--	--	137
1962	57	160	254	361	403	421	--	--	--	--	--	221
Middle Atlantic:												
1955-61	--	183	267	388	532	588	640	669	680	634	--	290
1962	--	162	303	390	438	606	659	719	718	734	--	396
North Atlantic:												
1955-61	--	180	362	448	548	605	660	688	768	723	774	472
1962	--	--	410	476	527	595	638	680	721	--	--	534
FALL FISHERY												
North Carolina:												
1955-61	38	123	370	500	600	637	695	708	774	713	--	393
1962	34	180	377	469	521	603	646	761	--	--	--	436

for the 7-year period, 1955-61. The increase reflected the greater percentage of older, primarily age-4, fish in the catches.

The mean lengths and mean weights of age-4 fish were less than the 7-year means in all areas except the Chesapeake Bay Area. The means of fish older than age 4 were about the same as the 7-year means, and the means of age-2 and -3 fish were greater than the 7-year means. The means of age-1 fish were less in the Middle Atlantic Area, but greater in the South Atlantic and Chesapeake Bay Areas.

REVIEW OF THE FISHERY

The characteristics of the 1962 purse seine catch reflect the susceptibility of the fishery to variations in year-class strength and weather. In the Middle and North Atlantic Areas, the fishery began about 10 days earlier than usual. Fish of the superabundant 1958 year class were plentiful from Cape Charles, Va., to the southern shore of Long Island, and remained concentrated off the northern New Jersey and southern Long Island coasts until early July. Favorable weather permitted continual fishing during this period, and catches were larger in May and June than in the same period of any previous year. After these older fish disappeared in July, the catches in the Middle and North Atlantic Areas declined. From July to September they were smaller than in any previous year. The scarcity of fish was related to the relatively low abundance of the 1959, 1960, and 1961 year classes. In early October large fish of the 1958 year class reappeared in extensive schools off the coast of eastern Long Island. The schools remained relatively close inshore, where they were accessible to the fleet, and favorable weather permitted the vessels to fish more days than was usual in other years. The season in the Middle and North Atlantic Areas continued about 10 days longer than in most previous years, and the catches in October set new records for both areas. Had not the large fish of the superabundant 1958 year class been unusually accessible in May and June and again in October, however, the 1962 season would have been the poorest of any recorded year.

The large catch in the Chesapeake Bay Area--second only to the 1959 catch--resulted primarily from increased fishing effort. In addition to the regular fleet operating in the Bay, five large vessels from Wildwood fished there during July, August, and part of September. The season also continued later than usual.

The occurrence of three successively poor year classes and the increased effort on younger fish are expected to cause a sharp decline in catches in the Middle and North Atlantic Areas in the next few years. A series of large year classes must occur before the catches can equal those of 1953-62.

Since most fish found in the South Atlantic and Chesapeake Bay Areas are age 1, the catches probably will continue to fluctuate with year-class strength. A series of exceptionally poor year classes, however, could cause reduced catches in these areas.

SUMMARY

1. The 1962 purse seine catch of Atlantic menhaden was 629,000 tons--600,000 tons in the summer fishery and 29,000 tons in the fall fishery of North Carolina. The largest part of the summer catch was landed in the Middle Atlantic Area and the smallest part in the South Atlantic Area.

2. The estimated number of purse seine sets was less than the 7-year mean (1955-61) in all areas. The greatest number of sets (12,472) was made in the Middle Atlantic Area and the least number (513) in the North Carolina fall fishery. The catch per set was 23 tons in the summer fishery and 57 tons in the fall fishery of North Carolina.

3. Fish again were caught in Cape Cod and Massachusetts Bays after being scarce for several years. As in previous years, the most productive fishing grounds were Chesapeake Bay and the waters within the 20-fathom contour from Delaware Bay to Long Island Sound.

4. In the Middle and North Atlantic Areas the catches in May, June, and October were the largest recorded for each month, and the catches in July, August, and September the smallest recorded. High winds, rain, and unseasonably cold weather curtailed fishing in the North Carolina fall fishery; only 15 landings were made after November 24.

5. The 1958 year class (age 4) dominated the fishery for the fourth consecutive year in the Middle and North Atlantic Areas and accounted for over 5 percent of the catch in the Chesapeake Bay Area. For the third consecutive year, age 1 contributed less than 3 percent

of the catch in the Middle Atlantic Area and less than 45 percent of the catch in the Chesapeake Bay Area and was absent from catches in the North Atlantic Area.

6. Age-4 fish generally were shorter and lighter; and age-1, -2, and -3 fish were longer and heavier than fish of corresponding ages in previous years.

ACKNOWLEDGMENT

We had the cooperation of the plant owners and managers, who provided space and facilities for sampling the catch and furnished records of vessel landings, and the vessel captains and pilots, who kept logbook records of their daily fishing activities.

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APPENDIX TABLES

Appendix table 1.--Length-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, South Atlantic Area, excluding the North Carolina fall fishery, 1962

[M - male, F - female, T - total, including specimens for which sex was not determined]

Fork length	Age												Total
	0			1			2			3			
	M	F	T	M	F	T	M	F	T	M	F	T	
Mm.													
90- 94.....	-	-	-	-	-	-	-	-	-	-	-	-	-
95- 99.....	-	-	-	1	-	7	-	-	-	-	-	-	7
100-104.....	-	-	-	1	2	7	-	-	-	-	-	-	7
105-109.....	-	-	-	5	-	9	-	-	-	-	-	-	9
110-114.....	-	-	-	3	2	7	-	-	-	-	-	-	7
115-119.....	-	-	-	5	3	8	-	-	-	-	-	-	8
120-124.....	-	-	-	8	7	17	-	-	-	-	-	-	17
125-129.....	-	1	1	19	13	33	-	-	-	-	-	-	34
130-134.....	-	-	-	29	27	57	1	-	1	-	-	-	58
135-139.....	-	-	-	31	24	55	1	-	1	-	-	-	56
140-144.....	-	1	1	27	42	69	-	-	-	-	-	-	70
145-149.....	-	1	1	40	35	75	-	-	-	-	-	-	76
150-154.....	-	2	2	22	19	41	18	8	26	-	-	-	69
155-159.....	-	1	1	34	21	65	16	21	40	-	-	-	106
160-164.....	-	-	-	53	56	113	12	25	39	-	-	-	152
165-169.....	-	1	1	40	42	83	31	21	63	-	-	-	147
170-174.....	-	1	1	35	37	73	47	46	104	-	-	-	178
175-179.....	-	-	-	31	29	63	57	56	132	-	-	-	195
180-184.....	-	-	-	25	24	49	59	65	134	1	-	1	184
185-189.....	-	-	-	16	19	35	51	68	124	-	1	1	160
190-194.....	-	-	-	12	11	23	46	67	117	-	1	1	141
195-199.....	-	-	-	9	10	19	24	30	54	-	1	1	74
200-204.....	-	-	-	2	4	9	11	15	27	1	1	2	38
205-209.....	-	-	-	2	1	5	3	5	8	-	-	1	14
210-214.....	-	-	-	-	-	2	4	2	7	2	-	2	11
215-219.....	-	-	-	2	-	4	-	4	6	-	-	-	10
220-224.....	-	-	-	-	-	-	1	1	3	-	-	1	4
225-229.....	-	-	-	-	1	1	1	-	1	-	-	1	3
230-234.....	-	-	-	-	-	-	-	3	4	-	-	-	4
235-239.....	-	-	-	1	-	1	1	1	2	1	-	1	4
240-244.....	-	-	-	1	-	1	-	-	1	-	-	-	2
245-249.....	-	-	-	-	-	-	-	-	1	-	-	-	1
Total.....	-	8	8	454	429	931	384	438	895	5	4	12	1,846

Appendix table 2.--Length-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, Chesapeake Bay Area, 1962

[M - male, F - female, T - total, including specimens for which sex was not determined]

Fork length	Age																		Total
	0			1			2			3			4			5			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Mm.																			
110-114.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
115-119.....	4	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
120-124.....	9	14	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29
125-129.....	12	9	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32
130-134.....	19	15	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46
135-139.....	27	18	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	59
140-144.....	31	33	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71
145-149.....	21	23	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48
150-154.....	17	14	32	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	33
155-159.....	14	16	30	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	33
160-164.....	9	14	23	3	2	5	-	1	1	-	-	-	-	-	-	-	-	-	29
165-169.....	4	7	11	4	3	7	1	-	1	-	-	-	-	-	-	-	-	-	19
170-174.....	2	3	5	9	8	17	3	1	4	-	-	-	-	-	-	-	-	-	26
175-179.....	1	-	1	24	22	46	4	2	6	-	-	-	-	-	-	-	-	-	53
180-184.....	1	1	2	50	28	79	10	14	24	-	-	-	-	-	-	-	-	-	105
185-189.....	1	-	1	52	50	103	27	19	46	-	-	-	-	-	-	-	-	-	150
190-194.....	-	-	-	52	59	111	29	22	51	-	-	-	-	-	-	-	-	-	162
195-199.....	-	-	-	71	64	135	38	30	68	-	-	-	-	-	-	-	-	-	203
200-204.....	-	-	-	67	46	113	37	39	76	-	-	-	-	-	-	-	-	-	189
205-209.....	-	-	-	30	49	79	49	28	77	-	-	-	-	-	-	-	-	-	156
210-214.....	-	-	-	35	32	67	36	34	70	-	-	-	-	-	-	-	-	-	137
215-219.....	-	-	-	27	32	59	37	29	66	-	-	-	-	-	-	-	-	-	125
220-224.....	-	-	-	34	31	65	34	38	72	3	-	3	-	-	-	-	-	-	140
225-229.....	-	-	-	31	27	58	29	34	63	-	-	-	-	-	-	-	-	-	121
230-234.....	-	-	-	26	26	52	49	42	91	5	2	7	1	-	1	-	-	-	151
235-239.....	-	-	-	16	15	31	58	63	122	2	-	2	-	-	-	-	-	-	155
240-244.....	-	-	-	13	16	29	68	64	132	1	3	4	-	-	-	-	-	-	165
245-249.....	-	-	-	10	5	15	68	57	126	4	4	8	-	-	-	-	-	-	149
250-254.....	-	-	-	1	6	7	103	74	177	4	4	8	-	-	-	-	-	-	192
255-259.....	-	-	-	3	4	7	98	82	180	4	8	12	2	1	3	-	-	-	202
260-264.....	-	-	-	1	1	2	69	65	134	7	7	14	5	7	12	-	-	-	162
265-269.....	-	-	-	-	-	-	62	71	133	11	10	21	14	6	20	-	-	-	174
270-274.....	-	-	-	1	-	1	35	52	87	20	12	32	15	9	24	-	-	-	144
275-279.....	-	-	-	-	-	-	30	29	59	9	9	18	12	14	26	-	-	-	103
280-284.....	-	-	-	-	-	-	10	22	32	7	7	14	17	16	33	1	-	1	80
285-289.....	-	-	-	-	-	-	4	15	19	7	9	16	10	12	22	-	-	-	57
290-294.....	-	-	-	-	-	-	-	6	6	1	8	9	5	22	27	1	-	1	43
295-299.....	-	-	-	-	-	-	-	-	-	1	8	9	1	8	9	-	-	-	18
300-304.....	-	-	-	-	-	-	-	-	-	-	3	3	1	3	4	-	-	-	7
305-309.....	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-	-	3
310-314.....	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	2
315-319.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
320-324.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total.....	172	167	400	563	526	1,092	988	933	1,923	86	94	180	83	103	186	2	-	2	3,783

Appendix table 3.--Length-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, Middle Atlantic Area, 1962

[M - male, F - female, T - total, including specimens for which sex was not determined]

Fork length	Age																									Total
	1			2			3			4			5			6			7			8			9			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Mm.																												
170-174...	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
175-179...	5	2	7	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
180-184...	2	5	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
185-189...	7	4	11	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13
190-194...	8	6	14	6	6	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
195-199...	13	14	27	10	4	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41
200-204...	8	7	15	18	7	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40
205-209...	4	5	9	8	13	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
210-214...	6	1	7	13	16	29	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37
215-219...	7	4	11	21	13	34	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47
220-224...	4	5	9	24	25	49	4	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62
225-229...	4	1	5	41	29	70	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	77
230-234...	4	1	5	33	25	58	4	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68
235-239...	3	2	5	30	39	69	3	2	5	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	81
240-244...	2	-	2	64	44	109	3	2	5	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	118
245-249...	-	2	2	65	63	128	6	4	10	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	142
250-254...	-	-	-	88	81	169	7	10	17	6	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	192
255-259...	-	1	1	108	85	193	25	9	34	13	3	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	244
260-264...	-	-	-	128	112	240	56	17	73	56	11	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	380
265-269...	-	-	-	108	112	220	78	48	126	101	45	146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	492
270-274...	-	-	-	77	96	173	151	89	240	172	104	276	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	691
275-279...	-	-	-	39	58	98	133	137	270	245	187	432	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800
280-284...	-	-	-	13	21	34	96	144	240	203	257	460	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	735
285-289...	-	-	-	10	12	22	51	88	139	122	190	314	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	476
290-294...	-	-	-	7	4	11	26	61	88	77	130	207	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	307
295-299...	-	-	-	1	8	9	17	37	54	62	83	145	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	211
300-304...	-	-	-	3	2	5	16	21	37	69	86	155	9	2	11	-	-	-	-	-	-	-	-	-	-	-	-	208
305-309...	-	-	-	1	-	1	6	23	29	60	75	135	12	5	17	4	-	4	-	-	-	-	-	-	-	-	-	186
310-314...	-	-	-	-	-	-	2	13	15	57	60	117	28	12	40	14	1	15	-	-	-	-	-	-	-	-	-	187
315-319...	-	-	-	-	-	-	-	7	7	27	64	91	20	17	37	11	4	15	2	-	2	-	-	-	-	-	-	152
320-324...	-	-	-	-	-	-	-	1	1	11	48	59	17	16	33	19	16	35	-	-	-	-	-	-	-	-	-	128
325-329...	-	-	-	-	-	-	-	1	1	1	43	44	7	21	28	9	22	31	1	-	1	-	-	-	-	-	-	105
330-334...	-	-	-	-	-	-	-	-	-	-	15	15	3	11	15	6	26	32	1	4	5	1	1	2	-	-	-	69
335-339...	-	-	-	-	-	-	-	-	-	-	4	4	-	8	8	4	23	27	-	5	5	-	1	1	-	-	-	45
340-344...	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	-	8	8	-	6	6	-	-	-	-	-	-	17
345-349...	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	1	1	2	-	4	4	-	-	-	-	1	1	9
350-354...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	1	1	-	-	-	-	-	-	4
355-359...	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
Total...	79	62	141	919	875	1,796	689	715	1,405	1,283	1,411	2,696	102	98	201	68	104	172	4	21	25	1	2	3	-	1	1	6,440

Appendix table 4.--Length-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, North Atlantic Area, 1962

[M - male, F - female, T - total, including specimens for which sex was not determined]

Fork length	Age																					Total
	2			3			4			5			6			7			8			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Mm.																						
250-254.....	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
255-259.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260-264.....	1	-	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
265-269.....	1	1	2	2	2	4	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	9
270-274.....	3	5	8	10	3	13	7	5	12	-	-	-	-	-	-	-	-	-	-	-	-	33
275-279.....	-	5	5	28	11	39	28	10	38	1	-	1	-	-	-	-	-	-	-	-	-	83
280-284.....	3	1	4	31	37	69	47	42	89	1	-	1	-	-	-	-	-	-	-	-	-	163
285-289.....	4	4	8	38	36	75	78	62	142	2	-	2	-	-	-	-	-	-	-	-	-	227
290-294.....	3	4	7	37	44	84	95	74	174	1	-	1	-	-	-	-	-	-	-	-	-	266
295-299.....	2	3	5	19	45	67	100	83	189	6	-	6	-	-	-	-	-	-	-	-	-	267
300-304.....	-	2	4	18	35	54	132	106	243	13	-	13	4	-	4	-	-	-	-	-	-	318
305-309.....	-	-	1	14	31	45	160	88	248	25	3	29	6	-	6	-	-	-	-	-	-	329
310-314.....	-	-	-	10	20	32	124	124	256	27	12	39	27	4	31	1	2	3	-	-	-	361
315-319.....	-	-	-	4	3	9	51	140	197	26	14	42	26	11	37	-	2	2	-	-	-	287
320-324.....	-	-	-	-	7	7	20	108	134	16	28	46	17	25	43	-	1	1	-	-	-	231
325-329.....	-	-	-	-	4	4	6	57	65	7	22	33	10	29	39	-	2	2	3	-	3	146
330-334.....	-	-	-	-	2	2	1	23	29	4	19	26	11	33	44	3	6	9	1	-	1	111
335-339.....	-	-	-	-	-	-	-	1	3	-	11	14	2	20	23	-	2	2	-	2	2	44
340-344.....	-	-	-	-	1	1	-	1	2	-	5	5	1	11	12	-	3	4	-	-	-	24
345-349.....	-	-	-	-	-	-	-	1	1	-	1	2	-	4	4	-	2	2	-	4	4	13
350-354.....	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-	2
355-359.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
360-364.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
365-369.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total.....	18	26	47	211	282	506	851	926	1,825	129	116	261	104	137	243	4	22	27	4	7	11	2,920

Appendix table 5.--Length-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, North Carolina fall fishery, 1962

[M - male, F - female, T - total, including specimens for which sex was not determined]

Fork length	Age																								Total
	0			1			2			3			4			5			6			7			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
Mm.																									
100-104.....	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
105-109.....	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
110-114.....	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
115-119.....	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
120-124.....	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
125-129.....	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
130-134.....	6	3	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
135-139.....	2	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
140-144.....	1	3	4	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
145-149.....	1	1	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
150-154.....	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
155-159.....	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
160-164.....	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
165-169.....	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
170-174.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
175-179.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180-184.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
185-189.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
190-194.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
195-199.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200-204.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
205-209.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210-214.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
215-219.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
220-224.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
225-229.....	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
230-234.....	-	-	-	-	1	1	1	-	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	3
235-239.....	-	-	-	-	-	-	1	2	3	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	4
240-244.....	-	-	-	2	1	3	3	-	3	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	7
245-249.....	-	-	-	-	1	1	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
250-254.....	-	-	-	1	-	1	7	2	9	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	11
255-259.....	-	-	-	-	-	-	6	2	8	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	9
260-264.....	-	-	-	1	-	1	8	5	13	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	15
265-269.....	-	-	-	-	1	1	13	9	22	1	-	1	2	-	2	-	-	-	-	-	-	-	-	-	26
270-274.....	-	-	-	-	1	1	9	10	19	4	-	4	7	3	10	-	-	-	-	-	-	-	-	-	34
275-279.....	-	-	-	-	-	-	15	12	27	2	1	3	6	4	10	-	1	1	-	-	-	-	-	-	41
280-284.....	-	-	-	-	-	-	7	18	25	5	2	7	11	14	25	-	1	1	-	-	-	-	-	-	58
285-289.....	-	-	-	-	-	-	1	9	10	4	7	11	4	3	7	-	-	-	-	-	-	-	-	-	28
290-294.....	-	-	-	-	-	-	2	1	3	6	5	11	4	12	16	-	1	1	-	-	-	-	-	-	31
295-299.....	-	-	-	-	-	-	-	-	-	1	2	3	5	10	15	2	-	2	-	-	-	-	-	-	20
300-304.....	-	-	-	-	-	-	1	1	2	1	8	9	7	10	17	1	1	2	-	-	-	-	-	-	30
305-309.....	-	-	-	-	-	-	1	1	2	1	2	3	8	6	14	2	-	2	-	1	1	-	-	-	22
310-314.....	-	-	-	-	-	-	1	1	2	-	1	1	6	14	20	3	1	4	4	-	4	-	-	-	31
315-319.....	-	-	-	-	-	-	-	1	1	-	2	2	3	13	16	7	1	8	1	-	1	-	-	-	28
320-324.....	-	-	-	-	-	-	-	2	2	-	1	1	3	8	11	1	5	6	1	1	2	-	1	1	23
325-329.....	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4	1	2	3	-	4	4	-	-	-	11
330-334.....	-	-	-	-	-	-	-	1	1	-	-	-	-	2	2	-	2	2	-	1	1	-	-	-	6
335-339.....	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-	-	-	1	1	-	-	-	4
340-344.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
345-349.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2
Total.....	20	12	33	8	8	16	79	77	156	27	34	61	67	106	173	17	15	32	6	8	14	-	4	4	489

Appendix table 6.--Weight-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, South Atlantic Area, excluding the North Carolina fall fishery, 1962

[M - male, F - female, T - total, including specimens for which sex was not determined]

Weight	Age												Total
	0			1			2			3			
	M	F	T	M	F	T	M	F	T	M	F	T	
G.													
10- 19.....	-	-	-	2	1	16	-	-	-	-	-	-	16
20- 29.....	-	-	-	14	7	26	-	-	-	-	-	-	26
30- 39.....	-	-	-	57	47	106	-	-	-	-	-	-	106
40- 49.....	-	1	1	68	64	132	2	1	3	-	-	-	136
50- 59.....	-	2	2	38	42	81	13	7	20	-	-	-	103
60- 69.....	-	2	2	48	50	105	20	25	47	-	-	-	154
70- 79.....	-	2	2	72	58	136	31	28	65	-	-	-	203
80- 89.....	-	1	1	44	40	85	52	49	112	-	-	-	198
90- 99.....	-	-	-	30	33	66	57	56	129	-	-	-	195
100-109.....	-	-	-	29	31	61	54	55	125	-	-	-	186
110-119.....	-	-	-	19	23	42	42	62	110	1	-	1	153
120-129.....	-	-	-	10	12	22	41	57	103	-	1	1	126
130-139.....	-	-	-	10	14	24	26	33	62	1	3	4	90
140-149.....	-	-	-	4	2	7	24	30	54	-	-	-	61
150-159.....	-	-	-	1	2	8	7	16	24	-	-	-	32
160-169.....	-	-	-	2	1	3	7	6	13	-	-	-	16
170-179.....	-	-	-	1	-	1	2	5	8	-	-	1	10
180-189.....	-	-	-	1	-	3	1	1	4	1	-	1	8
190-199.....	-	-	-	-	-	-	1	2	4	-	-	-	4
200-209.....	-	-	-	1	-	2	-	-	1	-	-	1	4
210-219.....	-	-	-	-	-	-	-	-	-	-	-	1	1
220-229.....	-	-	-	-	-	-	-	1	1	-	-	-	1
230-239.....	-	-	-	1	-	1	1	-	2	-	-	-	3
240-249.....	-	-	-	-	1	1	1	-	1	-	-	-	2
250-259.....	-	-	-	-	1	1	-	1	1	1	-	1	3
260-269.....	-	-	-	-	-	-	1	-	1	1	-	1	2
270-279.....	-	-	-	1	-	1	-	-	-	-	-	-	1
280-289.....	-	-	-	-	-	-	1	3	5	-	-	-	5
290-299.....	-	-	-	-	-	-	-	-	-	-	-	-	-
300-309.....	-	-	-	1	-	1	-	-	-	-	-	-	1
Total.....	-	8	8	454	429	931	384	438	895	5	4	12	1,846

Appendix table 7.--Weight-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, Chesapeake Bay Area, 1962

[M = male, F = female, T = total, including specimens for which sex was not determined]

Weight	Age																		Total
	0			1			2			3			4			5			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
G.																			
20-29.....	4	1	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
30-39.....	26	24	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71
40-49.....	35	39	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	97
50-59.....	44	36	88	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	89
60-69.....	29	24	56	5	-	5	-	-	-	-	-	-	-	-	-	-	-	-	61
70-79.....	18	21	39	5	5	10	-	1	1	-	-	-	-	-	-	-	-	-	50
80-89.....	7	14	21	6	5	11	2	-	2	-	-	-	-	-	-	-	-	-	34
90-99.....	5	7	12	25	24	50	7	6	13	-	-	-	-	-	-	-	-	-	75
100-109.....	2	-	2	38	32	70	14	15	29	-	-	-	-	-	-	-	-	-	101
110-119.....	1	1	2	54	44	99	23	20	43	-	-	-	-	-	-	-	-	-	144
120-129.....	-	-	-	49	49	98	35	26	61	-	-	-	-	-	-	-	-	-	159
130-139.....	1	-	1	61	49	110	30	17	47	-	-	-	-	-	-	-	-	-	158
140-149.....	-	-	-	52	51	103	34	32	66	-	-	-	-	-	-	-	-	-	169
150-159.....	-	-	-	38	41	79	35	23	58	-	-	-	-	-	-	-	-	-	137
160-169.....	-	-	-	44	34	78	40	31	71	-	-	-	-	-	-	-	-	-	149
170-179.....	-	-	-	31	36	67	20	31	52	-	-	-	-	-	-	-	-	-	119
180-189.....	-	-	-	20	23	43	29	26	55	1	-	1	-	-	-	-	-	-	99
190-199.....	-	-	-	29	20	49	34	27	61	-	1	1	-	-	-	-	-	-	111
200-209.....	-	-	-	17	26	43	26	26	52	2	-	2	1	-	1	-	-	-	98
210-219.....	-	-	-	18	13	31	25	30	55	4	-	4	-	-	-	-	-	-	90
220-229.....	-	-	-	17	12	29	25	25	50	3	1	4	-	-	-	-	-	-	83
230-239.....	-	-	-	11	15	26	36	38	74	-	-	-	-	-	-	-	-	-	100
240-249.....	-	-	-	8	8	16	44	40	84	1	-	1	-	-	-	-	-	-	101
250-259.....	-	-	-	7	6	13	44	32	77	1	2	3	-	-	-	-	-	-	93
260-269.....	-	-	-	7	8	15	67	40	107	2	5	7	-	-	-	-	-	-	129
270-279.....	-	-	-	7	9	16	52	42	94	2	1	3	1	-	1	-	-	-	114
280-289.....	-	-	-	3	7	10	49	50	99	2	3	5	1	1	2	-	-	-	116
290-299.....	-	-	-	3	2	5	53	57	110	4	5	9	4	1	5	-	-	-	129
300-309.....	-	-	-	1	1	2	50	42	92	-	3	3	2	2	4	-	-	-	101
310-319.....	-	-	-	1	1	2	48	30	78	5	4	9	5	3	8	-	-	-	97
320-329.....	-	-	-	1	3	4	24	28	52	6	7	13	5	3	8	-	-	-	77
330-339.....	-	-	-	2	-	2	23	39	62	3	2	5	2	3	5	-	-	-	74
340-349.....	-	-	-	-	-	-	19	30	49	8	2	10	6	5	11	-	-	-	70
350-359.....	-	-	-	-	-	-	18	15	33	7	6	13	8	6	14	-	-	-	60
360-369.....	-	-	-	-	-	-	22	17	39	11	2	13	8	1	9	-	-	-	61
370-379.....	-	-	-	2	-	2	9	15	24	2	4	6	1	6	7	-	-	-	39
380-389.....	-	-	-	-	-	-	12	17	29	4	7	11	2	8	10	1	-	1	51
390-399.....	-	-	-	-	-	-	10	8	18	2	7	9	5	7	12	-	-	-	39
400-409.....	-	-	-	-	-	-	10	9	19	3	2	5	5	8	13	-	-	-	37
410-419.....	-	-	-	-	-	-	8	11	19	2	-	2	5	2	7	-	-	-	28
420-429.....	-	-	-	-	-	-	2	6	8	5	2	7	2	4	6	-	-	-	21
430-439.....	-	-	-	-	-	-	7	7	14	-	4	4	4	4	8	-	-	-	26
440-449.....	-	-	-	-	-	-	2	11	13	2	4	6	2	1	3	-	-	-	22
450-459.....	-	-	-	-	-	-	-	-	-	1	-	1	5	1	6	1	-	1	8
460-469.....	-	-	-	-	-	-	-	2	2	2	1	3	4	7	11	-	-	-	16
470-479.....	-	-	-	-	-	-	-	1	1	-	2	2	1	5	6	-	-	-	9
480-489.....	-	-	-	-	-	-	-	2	2	1	2	3	1	4	5	-	-	-	10
490-499.....	-	-	-	-	-	-	-	3	3	-	3	3	2	4	6	-	-	-	12
500-509.....	-	-	-	-	-	-	-	2	2	-	2	2	-	3	3	-	-	-	7
510-519.....	-	-	-	-	-	-	-	-	-	-	3	3	-	3	3	-	-	-	6
520-529.....	-	-	-	-	-	-	-	-	-	-	3	3	-	4	4	-	-	-	7
530-539.....	-	-	-	-	-	-	-	-	-	-	2	2	-	3	3	-	-	-	5
540-549.....	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	-	-	-	3
550-559.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
560-569.....	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
570-579.....	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	2
580-589.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
590-599.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
600-609.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
610-619.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
620-629.....	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
Total.....	172	167	400	563	524	1,089	988	930	1,920	86	94	180	83	103	186	2	-	2	3,377

Appendix table 8.--Weight-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, Middle Atlantic Area, 1962

[M - male, F - female, T - total, including specimens for which sex was not determined]

Weight	Age																											Total
	1			2			3			4			5			6			7			8			9			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
C.																												
80-89.....	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
90-99.....	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
100-109.....	7	4	11	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
110-119.....	5	3	8	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
120-129.....	13	9	22	5	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28
130-139.....	12	12	24	9	10	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43
140-149.....	6	5	11	7	9	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27
150-159.....	3	2	5	18	8	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31
160-169.....	4	1	5	7	9	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21
170-179.....	3	2	5	14	11	25	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33
180-189.....	2	5	7	11	8	19	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27
190-199.....	1	-	1	16	8	24	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
200-209.....	3	2	5	13	20	33	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39
210-219.....	3	2	5	20	12	32	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40
220-229.....	2	2	4	18	19	37	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44
230-239.....	4	1	5	22	23	45	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55
240-249.....	4	2	6	32	21	53	2	-	2	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62
250-259.....	1	-	1	27	36	63	3	1	4	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70
260-269.....	2	-	2	48	37	85	-	2	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	91
270-279.....	1	1	2	50	43	93	7	4	11	4	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	112
280-289.....	-	1	1	51	48	99	6	5	11	6	1	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	118
290-299.....	1	1	2	84	56	141	12	7	19	14	3	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	179
300-309.....	1	1	2	60	66	126	24	13	37	17	2	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	184
310-319.....	-	1	1	64	55	119	32	15	47	33	10	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210
320-329.....	-	-	-	57	42	99	48	14	62	48	18	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	227
330-339.....	-	-	-	47	46	93	56	25	81	56	31	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	261
340-349.....	-	-	-	41	49	90	58	29	87	92	42	134	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	312
350-359.....	-	-	-	38	37	75	70	44	114	82	54	136	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	325
360-369.....	-	-	-	32	43	75	50	58	108	89	57	146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	329
370-379.....	-	-	-	40	35	75	52	50	102	95	92	187	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	365
380-389.....	-	-	-	20	23	43	40	77	117	85	89	174	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	334
390-399.....	-	-	-	17	26	43	42	54	96	70	105	175	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	314
400-409.....	-	-	-	12	18	30	24	47	71	68	73	141	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	243
410-419.....	-	-	-	5	17	23	21	38	59	53	76	129	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	211
420-429.....	-	-	-	4	7	11	15	36	51	43	66	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	171
430-439.....	-	-	-	6	3	9	16	24	40	28	60	88	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	138
440-449.....	-	-	-	3	6	9	14	20	34	22	57	80	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	124
450-459.....	-	-	-	1	2	3	8	16	24	29	39	69	-	1	1	1	-	1	-	-	-	-	-	-	-	-	-	98
460-469.....	-	-	-	5	5	10	10	11	21	28	34	62	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	95
470-479.....	-	-	-	2	-	2	9	15	24	26	30	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	82
480-489.....	-	-	-	3	1	4	11	11	22	21	25	46	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	73
490-499.....	-	-	-	1	4	5	9	5	15	23	26	49	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	72
500-509.....	-	-	-	1	3	4	6	12	18	22	22	44	1	1	2	1	-	1	-	-	-	-	-	-	-	-	-	69
510-519.....	-	-	-	1	1	2	7	6	13	29	24	53	1	2	3	1	-	1	-	-	-	-	-	-	-	-	-	72
520-529.....	-	-	-	1	1	2	10	16	26	28	31	59	3	2	5	-	-	-	-	-	-	-	-	-	-	-	-	92
530-539.....	-	-	-	1	-	1	3	5	8	26	25	51	7	-	7	1	-	1	-	-	-	-	-	-	-	-	-	68
540-549.....	-	-	-	-	2	2	4	6	10	16	29	45	7	1	8	1	1	2	-	-	-	-	-	-	-	-	-	67
550-559.....	-	-	-	1	-	1	3	12	15	15	22	37	5	1	6	1	1	2	-	-	-	-	-	-	-	-	-	61
560-569.....	-	-	-	-	-	-	-	9	9	23	28	51	6	1	7	3	-	3	-	-	-	-	-	-	-	-	-	70
570-579.....	-	-	-	-	-	-	-	4	4	15	26	41	11	1	12	6	2	8	1	-	1	-	-	-	-	-	-	66
580-589.....	-	-	-	-	-	-	1	5	6	16	24	40	12	5	17	4	-	4	-	-	-	-	-	-	-	-	-	67
590-599.....	-	-	-	-	1	1	1	3	4	16	24	40	7	5	12	4	-	4	2	-	2	-	-	-	-	-	-	63
600-609.....	-	-	-	-	-	-	-	3	3	15	19	34	4	5	9	5	1	6	-	-	-	-	-	-	-	-	-	52
610-619.....	-	-	-	-	1	1	-	2	2	10	18	28	5	6	11	9	6	15	-	-	-	-	-	-	-	-	-	57
620-629.....	-	-	-	-	-	-	-	1	2	3	8	20	28	8	10	19	5	4	9	-	-	-	-	-	-	-	-	59
630-639.....	-	-	-	-	-	-	-	1	1	2	24	26	2	5	7	10	7	17	-	-	-	-	-	-	-	-	-	51
640-649.....	-	-	-	-	-	-	-	1	1	-	12	12	3	6	9	3	10	13	-	1	1	-	-	-	-	-	-	36
650-659.....	-	-	-	-	-	-	-	1	1	3	17	20	5	7	12	4	5	9	-	-	-	-	-	-	-	-	-	42
660-669.....	-	-	-	-	-	-	-	1	1	-	9	9	-	8	8	2	5	7	-	1	1	-	-	-	-	-	-	26
670-679.....	-	-	-	-	-	-	-	-	-	-	9	9	2	4	6	3	5	8	1	-	1	-	-	-	-	-	-	24
680-689.....	-	-	-	-	-	-	-	-	-	-	9	9	2	5	7	1	5	6	-	1	1	-	1	1	-	-	-	24
690-699.....	-	-	-	-	-	-	-	-	-	3	6	9	-	7	7	1	4	5	-	1	1	-	-	-	-	-	-	22
700-709.....	-	-	-	-	-	-	-	1	1	-	5	5	2	3	5	-	11	11	-	2	2	-	-	-	-	-	-	24
710-719.....	-	-	-	-	-	-	-	-	-	-	6	6	1	6	7	1	8	9	-	1	1	-	1	1	-	-	-	24
720-729.....	-	-	-	-	-	-	-	-	-	-	2	2	-	1	1	-	6	6	-	2	2	-	-	-	-	-	-	11
730-739.....	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	4	4	-	5	5	-	-	-	-	1	1	11
740-749.....	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	5	6	-	-	-	-	-	-	-	-	-	7
750-759.....	-	-	-	-	-	-	-	-	-	-	3	3	-	-	-	-	1	1	-	1	1	1	-	1	-	-	-	6
760-769.....	-	-	-	-	-	-	-	-	-	-	3	3	-	-	-	-	4	4	-	3	3	-	-	-	-	-	-	10
770-779.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	-	-	-	-	-	-	-	-	-	6
780-789.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
790-799.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
800-809.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
810-819.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
820-829.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
830-839.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
840-849.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
850-859.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
860-869.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
870-879.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
880-889.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
890-899.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
900-909.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
910-919.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
Total.....	79	62	141	918	874	1,794	689	714	1,404	1,283	1,410	2,695	102	98	201	68	104	172	4	21	25	1	2	3	-	1	1	6,436

Appendix table 9.--Weight-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, North Atlantic Area, 1962

[M = male, F = female, T = total, including specimens for which sex was not determined]

Weight	Age																					Total
	2			3			4			5			6			7			8			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
G.																						
280-289.....	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
290-299.....	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
300-309.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310-319.....	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
320-329.....	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
330-339.....	-	1	1	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
340-349.....	1	2	3	1	2	3	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	8
350-359.....	2	1	3	4	2	6	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	12
360-369.....	-	2	2	4	2	6	5	1	6	-	-	-	-	-	-	-	-	-	-	-	-	14
370-379.....	-	1	1	9	5	14	4	3	7	1	-	1	-	-	-	-	-	-	-	-	-	23
380-389.....	-	2	2	9	7	16	9	8	17	-	-	-	-	-	-	-	-	-	-	-	-	35
390-399.....	1	2	3	10	7	17	15	8	23	-	-	-	-	-	-	-	-	-	-	-	-	43
400-409.....	1	-	1	14	12	26	22	15	37	-	-	-	-	-	-	-	-	-	-	-	-	64
410-419.....	2	1	3	13	14	27	21	9	30	-	-	-	-	-	-	-	-	-	-	-	-	60
420-429.....	2	-	2	14	7	21	20	14	34	1	-	1	-	-	-	-	-	-	-	-	-	58
430-439.....	1	3	4	16	13	29	33	27	60	1	-	1	-	-	-	-	-	-	-	-	-	94
440-449.....	1	2	3	13	10	23	33	25	59	1	-	1	-	-	-	-	-	-	-	-	-	86
450-459.....	-	2	2	13	14	28	36	26	63	-	-	-	-	-	-	-	-	-	-	-	-	93
460-469.....	1	-	1	16	18	35	50	30	80	3	-	3	1	-	1	-	-	-	-	-	-	120
470-479.....	3	3	6	11	9	21	46	39	89	5	-	5	-	-	-	-	-	-	-	-	-	121
480-489.....	-	1	1	7	16	24	36	32	69	2	-	2	1	-	1	-	-	-	-	-	-	97
490-499.....	-	-	-	5	20	26	59	32	94	5	1	6	-	-	-	-	-	-	-	-	-	126
500-509.....	1	2	3	12	9	21	52	32	85	5	-	5	2	3	5	-	1	-	-	-	-	120
510-519.....	-	-	-	5	18	23	64	42	106	10	2	12	2	-	2	-	-	-	-	-	-	143
520-529.....	-	1	1	4	17	21	45	44	90	5	2	7	1	-	1	-	-	-	-	-	-	120
530-539.....	-	-	-	9	10	21	43	32	75	7	2	9	1	1	2	-	-	-	-	-	-	107
540-549.....	-	-	-	6	8	15	59	34	96	9	3	12	7	-	7	-	-	-	-	-	-	130
550-559.....	-	-	-	2	13	15	36	43	81	12	4	16	9	2	11	-	-	-	-	-	-	123
560-569.....	-	1	1	6	6	14	34	40	76	10	1	13	9	1	10	-	1	1	-	-	-	115
570-579.....	-	-	-	1	6	8	29	40	69	10	5	16	7	3	10	-	1	1	-	-	-	104
580-589.....	-	-	-	4	6	10	23	46	74	5	10	15	7	3	10	-	-	-	-	-	-	109
590-599.....	-	-	-	2	8	10	20	51	74	9	7	16	7	5	12	-	2	2	-	-	-	114
600-609.....	-	-	-	1	1	2	12	33	46	7	6	13	8	6	14	1	-	1	-	-	-	76
610-619.....	-	-	-	-	6	7	12	47	60	3	11	14	9	5	14	-	-	-	1	-	1	96
620-629.....	-	-	-	-	1	1	8	38	48	5	7	13	8	6	14	-	1	1	1	-	1	78
630-639.....	-	-	-	-	2	2	5	28	35	1	6	9	3	10	13	1	1	2	1	-	1	62
640-649.....	-	-	-	-	1	2	3	16	21	1	6	8	5	10	15	-	1	1	-	-	-	47
650-659.....	-	-	-	-	-	-	-	12	16	2	3	7	6	10	16	-	2	2	1	-	1	42
660-669.....	-	-	-	-	2	2	1	23	24	2	6	8	2	12	14	1	-	1	-	-	-	49
670-679.....	-	-	-	-	-	-	1	15	17	-	2	3	2	8	10	-	1	1	-	-	-	31
680-689.....	-	-	-	-	4	4	4	9	15	-	3	3	-	7	7	-	2	2	-	-	-	31
690-699.....	-	-	-	-	-	-	4	6	11	3	9	14	3	9	13	-	1	1	-	-	-	39
700-709.....	-	-	-	-	-	-	1	5	6	1	6	9	-	4	4	1	-	1	-	-	-	20
710-719.....	-	-	-	-	-	-	1	4	6	1	4	5	1	6	7	-	2	2	-	-	-	20
720-729.....	-	-	-	-	1	1	-	3	3	-	4	5	-	4	4	-	-	-	-	2	2	15
730-739.....	-	-	-	-	-	-	-	3	4	-	1	1	-	2	2	-	-	-	-	-	-	7
740-749.....	-	-	-	-	1	1	-	1	1	1	-	1	1	-	1	-	2	3	-	1	1	8
750-759.....	-	-	-	-	-	-	-	-	1	-	1	2	-	2	2	-	-	-	-	-	-	5
760-769.....	-	-	-	-	-	-	-	2	2	-	1	1	-	5	5	-	-	-	-	1	1	9
770-779.....	-	-	-	-	-	-	-	1	1	-	-	-	-	4	4	-	-	-	-	-	-	5
780-789.....	-	-	-	-	-	-	-	1	1	-	1	1	-	3	3	-	-	-	-	-	-	5
790-799.....	-	-	-	-	-	-	-	-	-	-	2	2	-	1	1	-	-	-	-	1	1	4
800-809.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	2
810-819.....	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	1	1	-	-	-	3
820-829.....	-	-	-	-	-	-	-	-	1	-	-	-	-	1	1	-	-	-	-	2	2	4
830-839.....	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	2
840-849.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
850-859.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
860-869.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
870-879.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
880-889.....	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	1
890-899.....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
Total.....	18	26	47	211	280	504	849	923	1,819	128	116	260	103	136	241	4	22	27	4	7	11	2,909

Appendix table 10--Weight-frequency distributions of Atlantic menhaden by age in years and sex in samples from purse seine catches, North Carolina fall fishery, 1962

[M - male, F - female, T - total, including specimens for which sex was not determined]

Weight	Age																								Total
	0			1			2			3			4			5			6			7			
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	
G.																									
10-19	4	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
20-29	4	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
30-39	8	4	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
40-49	4	7	11	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
50-59	-	-	-	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
60-69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70-79	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
80-89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90-99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100-109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
110-119	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
120-129	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
130-139	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
140-149	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150-159	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160-169	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
170-179	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180-189	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
190-199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200-209	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210-219	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
220-229	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
230-239	-	-	-	1	-	1	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
240-249	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
250-259	-	-	-	1	-	1	3	-	3	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	5
260-269	-	-	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
270-279	-	-	-	-	-	-	3	-	3	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	4
280-289	-	-	-	-	-	-	2	-	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	3
290-299	-	-	-	-	1	1	2	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
300-309	-	-	-	-	-	-	2	2	4	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	5
310-319	-	-	-	-	1	1	7	3	10	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-	13
320-329	-	-	-	1	-	1	6	2	8	-	-	-	1	1	2	-	-	-	-	-	-	-	-	-	11
330-339	-	-	-	-	1	1	4	2	6	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	8
340-349	-	-	-	-	-	-	5	3	8	2	-	2	1	-	1	-	-	-	-	-	-	-	-	-	11
350-359	-	-	-	-	-	-	4	3	7	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	8
360-369	-	-	-	-	-	-	8	7	15	1	-	1	1	1	2	-	-	-	-	-	-	-	-	-	18
370-379	-	-	-	-	-	-	3	3	6	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-	8
380-389	-	-	-	-	-	-	9	5	14	2	-	2	2	1	3	-	-	-	-	-	-	-	-	-	19
390-399	-	-	-	-	-	-	4	1	5	1	-	1	3	1	4	-	1	1	-	-	-	-	-	-	11
400-409	-	-	-	-	-	-	2	13	15	2	-	2	6	5	11	-	-	-	-	-	-	-	-	-	28
410-419	-	-	-	-	-	-	4	5	9	1	-	1	4	2	6	-	-	-	-	-	-	-	-	-	16
420-429	-	-	-	-	-	-	4	5	9	-	1	1	2	3	5	-	1	1	-	-	-	-	-	-	16
430-439	-	-	-	-	-	-	-	6	6	1	1	2	1	4	5	-	-	-	-	-	-	-	-	-	13
440-449	-	-	-	-	-	-	1	2	3	2	1	3	2	1	3	-	1	1	-	-	-	-	-	-	10
450-459	-	-	-	-	-	-	1	-	1	1	3	4	1	7	8	-	-	-	-	-	-	-	-	-	13
460-469	-	-	-	-	-	-	-	2	2	2	2	4	1	1	2	-	-	-	-	-	-	-	-	-	8
470-479	-	-	-	-	-	-	-	1	1	1	2	3	2	4	6	-	-	-	-	-	-	-	-	-	10
480-489	-	-	-	-	-	-	-	2	2	-	1	1	1	4	5	-	-	-	-	-	-	-	-	-	8
490-499	-	-	-	-	-	-	-	-	-	-	2	2	3	2	5	-	-	-	-	-	-	-	-	-	7
500-509	-	-	-	-	-	-	-	-	-	1	3	4	-	1	1	-	-	-	-	-	-	-	-	-	5
510-519	-	-	-	-	-	-	-	-	-	1	1	2	3	5	8	-	-	-	-	-	-	-	-	-	10
520-529	-	-	-	-	-	-	-	-	-	2	2	4	4	3	7	1	-	1	-	-	-	-	-	-	12
530-539	-	-	-	-	-	-	1	1	2	-	3	3	2	7	9	-	-	-	-	-	-	-	-	-	14
540-549	-	-	-	-	-	-	-	-	-	2	3	5	2	5	7	4	-	4	1	-	1	-	-	-	17
550-559	-	-	-	-	-	-	-	-	-	-	1	1	2	4	6	2	-	2	-	-	-	-	-	-	9
560-569	-	-	-	-	-	-	-	-	-	2	1	3	3	3	6	-	-	-	-	-	-	-	-	-	9
570-579	-	-	-	-	-	-	1	-	1	-	-	-	1	2	3	1	-	1	-	-	-	-	-	-	5
580-589	-	-	-	-	-	-	-	1	1	-	1	1	3	4	7	1	-	1	-	1	1	-	-	-	11
590-599	-	-	-	-	-	-	-	-	-	-	-	-	1	3	4	3	-	3	2	-	2	-	-	-	9
600-609	-	-	-	-	-	-	-	2	2	-	-	-	3	5	8	-	1	1	-	-	-	-	-	-	11
610-619	-	-	-	-	-	-	-	-	-	-	-	-	4	5	9	2	-	2	-	-	-	-	-	-	11
620-629	-	-	-	-	-	-	-	-	-	-	-	-	2	6	8	1	-	1	1	1	2	-	-	-	11
630-639	-	-	-	-	-	-	-	-	-	-	-	-	1	3	4	1	1	2	1	-	1	-	-	-	7
640-649	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	1	1	-	1	1	-	-	-	4
650-659	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	2	2	-	-	-	-	-	-	4
660-669	-	-	-	-	-	-	-	1	1	-	-	-	2	1	3	1	1	2	1	-	1	-	-	-	7
670-679	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	1	1	-	-	-	3
680-689	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	2
690-699	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	2	2	-	-	-	4
700-709	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	2
710-719	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1
720-729	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	1	1	3
730-739	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	1	1	-	-	-	3
740-749	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
750-759	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1
760-769	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
770-779	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
780-789	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	2
790-799	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800-809	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
810-819	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	20	12	33	8	8	16	79	77	156	27	34	61	67	105	172	17	15	32	6	8	14	-	4	4	488

Appendix table 11.--Mean fork length and weight of Atlantic menhaden by age and sex in samples from purse seine catches, South Atlantic area, excluding North Carolina fall fishery, 1962

[Numbers of fish in parentheses]

Age group	Sex		
	Males	Females	Both sexes
Fork length (mm.):			
0	--	151.8 (8)	151.8 (8)
1	157.7 (454)	159.2 (429)	158.4 (883)
2	179.7 (384)	182.1 (438)	181.0 (822)
3	209.2 (5)	194.2 (4)	202.6 (9)
Weight (g.):			
0	--	64.5 (8)	64.5 (8)
1	71.8 (454)	73.4 (429)	72.5 (883)
2	106.0 (384)	110.8 (438)	108.6 (822)
3	190.0 (5)	132.0 (4)	164.2 (9)

Appendix table 12.--Mean fork length and weight of Atlantic menhaden by age and sex in samples from purse seine catches, Chesapeake Bay area, 1962

[Numbers of fish in parentheses]

Age group	Sex		
	Males	Females	Both sexes
Fork length (mm.):			
0	143.0 (172)	144.5 (167)	143.7 (339)
1	204.0 (556)	205.7 (520)	204.9 (1,076)
2	237.6 (985)	240.9 (929)	239.2 (1,914)
3	265.6 (86)	273.0 (94)	269.5 (180)
4	276.1 (83)	283.4 (103)	280.2 (186)
5	287.0 (2)	--	287.0 (2)
Weight (g.):			
0	56.2 (172)	57.6 (167)	56.9 (339)
1	158.5 (556)	161.6 (518)	160.0 (1,074)
2	248.1 (985)	259.7 (926)	253.7 (1,911)
3	340.0 (86)	380.8 (94)	361.3 (180)
4	380.0 (83)	421.7 (103)	403.1 (186)
5	421.0 (2)	--	421.0 (2)

Appendix table 13.--Mean fork length and weight of Atlantic menhaden by age and sex in samples from purse seine catches, Middle Atlantic area, 1962

[Numbers of fish in parentheses]

Age group	Sex		
	Males	Females	Both sexes
Fork length (mm.):			
1	204.4 (79)	203.1 (62)	203.8 (141)
2	251.6 (919)	254.6 (875)	253.1 (1,794)
3	274.2 (689)	281.7 (715)	278.0 (1,404)
4	283.7 (1,283)	291.1 (1,411)	287.6 (2,694)
5	314.2 (102)	321.2 (98)	317.7 (200)
6	320.9 (68)	331.4 (104)	327.2 (172)
7	322.8 (4)	341.2 (21)	338.2 (25)
8-10	334.0 (1)	336.7 (3)	336.0 (4)
Weight (g.):			
1	163.9 (79)	159.7 (62)	162.0 (141)
2	297.8 (918)	307.6 (874)	302.6 (1,792)
3	372.7 (689)	406.8 (714)	390.0 (1,403)
4	416.5 (1,283)	457.3 (1,410)	437.9 (2,693)
5	581.3 (102)	631.7 (98)	606.0 (200)
6	613.9 (68)	687.8 (104)	658.6 (172)
7	610.5 (4)	740.1 (21)	719.4 (25)
8-10	758.0 (1)	709.6 (3)	721.8 (4)

Appendix table 14.--Mean fork length and weight of Atlantic menhaden by age and sex in samples from purse seine catches, North Atlantic area, 1962

[Numbers of fish in parentheses]

Age group	Sex		
	Males	Females	Both sexes
Fork length (mm.):			
2	281.2 (18)	282.6 (26)	282.0 (44)
3	290.0 (211)	296.0 (282)	293.5 (493)
4	300.5 (851)	307.7 (926)	304.3 (1,777)
5	311.7 (129)	325.1 (116)	318.0 (245)
6	318.3 (104)	328.9 (137)	324.3 (241)
7	326.0 (4)	332.4 (22)	331.4 (26)
8	327.2 (4)	345.8 (7)	339.1 (11)
Weight (g.):			
2	413.3 (18)	407.8 (26)	410.1 (44)
3	455.7 (211)	491.1 (280)	475.9 (491)
4	505.2 (849)	547.0 (923)	527.0 (1,772)
5	558.7 (128)	634.2 (116)	594.6 (244)
6	599.3 (103)	667.1 (136)	637.9 (239)
7	653.0 (4)	684.9 (22)	680.0 (26)
8	633.8 (4)	771.1 (7)	721.2 (11)

Appendix table 15.--Mean fork length and weight of Atlantic menhaden by age and sex in samples from purse seine catches, North Carolina fall fishery, 1962

[Numbers of fish in parentheses]

Age group	Sex		
	Males	Females	Both sexes
Fork length (mm.):			
0	124.6 (20)	136.9 (12)	129.2 (32)
1	198.6 (8)	217.1 (8)	207.9 (16)
2	267.9 (79)	277.9 (77)	272.9 (156)
3	283.1 (27)	292.0 (34)	288.1 (61)
4	292.6 (67)	303.0 (106)	299.0 (173)
5	312.4 (17)	314.3 (15)	313.3 (32)
6	316.2 (6)	325.8 (8)	321.6 (14)
7	--	339.2 (4)	339.2 (4)
Weight (g.):			
0	30.8 (20)	40.2 (12)	34.3 (32)
1	158.0 (8)	201.1 (8)	179.6 (16)
2	352.9 (79)	402.6 (77)	377.4 (156)
3	442.8 (27)	489.0 (34)	468.5 (61)
4	492.3 (67)	540.0 (105)	521.4 (172)
5	583.4 (17)	624.9 (15)	602.9 (32)
6	610.5 (6)	672.8 (8)	646.1 (14)
7	--	760.8 (4)	760.8 (4)

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